



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Idaho National Engineering and Environmental Laboratory
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Subject: Commentary on Poison in the Vadose Zone:
An examination of the threats to the Snake River Plain aquifer from the
Idaho National Engineering and Environmental Laboratory by...
Arjun Makhijani, Ph.D., and Michele Boyd
October 2001
Institute for Energy and Environmental Research

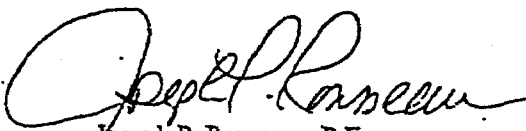
To Whom It May Concern:

No new information is contained in this report. The report manipulates existing information in a manner that is designed to discredit nearly all aspects of the environmental management program at the INEEL. It promotes acceptance of four "urgent" priorities (page 17), three of which call for recovery of buried wastes and immediate remediation of the vadose zone. To enlist support for these positions, the report relies on many journalistic gimmicks:

- 1) **Diversionary Discussion** – describes the use of extensive descriptions of contamination at sites on the INEEL that are of marginal relevance to the issue of buried wastes in the vadose zone. Example: considerable attention is devoted to a series of summary discussions of contamination resulting from direct disposal of waste into the aquifer, a practice that was discontinued over 17 years ago (pages 33 to 72). This mode of contamination is not comparable to the vadose zone problem, but leaves the reader with the impression that it is.
- 2) **Hyperbole** – describes data presentations that exaggerate the scope of present day contamination in the aquifer in order to incite and inflame the public's perception of the problem. Example: reporting of the maximum concentration of contaminants derived from measurements at or near the source of disposal and then comparing these as a percent of the drinking water standard (Tables 5, 6, 7). Additionally, no attempt is made to decay-correct data presented in these tables; vastly exaggerating the threat from tritium, strontium 90, cesium 137, and by inference plutonium 238, and plutonium 241 (Table 13). The rationale for using this approach is given on page 46 "... (i) to indicate the extent to which contaminants have migrated, and (ii) illustrate a possible upper limit of dangers, should site control and institutional memory be lost." The sheer size of the calculated percentages distorts and sensationalizes the magnitude of the problem. Additionally, most of the data that are presented describe contamination that resulted from direct disposal of waste into the aquifer (or waste derived from percolation ponds) as was noted under 1) above. The reader is led to believe that buried transuranic wastes in the vadose zone will result in similar contamination problems.
- 3) **Slight-of-Hand** – describes data that require the reader to be intimately familiar with the subject matter to properly interpret the data. Example: it is not possible for the reader to interpret the data presented on Table 18 and Figure 23 because the report fails to provide the necessary statistical screening criteria applicable to these data. Most of the transuranic data presented in Table 18 and Figure 23 are non-detects, but the reader would not be aware of this fact, since the report states that detections ranged from "tiny fractions of a picocurie per liter ..." (page 95) implying (or inferring) that all reported values represent positive detections. This was clearly not the intent of the original authors of the report cited as the source of Table 18 and the author of Figure 23. The intent was to present all analytical results, including those that do not meet the statistical screening criteria for a positive detection. Additionally proper interpretation of Figure 23 requires the reader to pay very careful attention to the fine print.

- 4) Innuendo - calls into question the integrity and motivation of scientists who have been very careful and thorough in reporting the results of their work. Example: Page 99 "We do not know whether these explanations [reference to cross contamination discussions in the 1976 USGS study] of artificial contamination sources for the high radionuclide readings were due to internal pressure to look for explanations other than the most evident one—that unpredictable, scattered migration of transuranic radionuclides was occurring". This comment is inconsistent with the previous quotation taken from the 1976 study and fails to acknowledge that the authors concluded that some of the reported detections were considered to be from migration of radionuclides. This approach undermines the credibility of good scientific work that could potentially challenge the conclusions of the report.
- 5) Misrepresentation - describes the liberal use of references that are all too often presented out of context or else neglect (see attached table) to advise the reader of accompanying qualifications that were of paramount concern to the original authors. Example: Use of the USGS 1976 study as noted above.
- 6) Generalization - describes mixing of fact with opinion or making claims that cannot be factually supported. Example: page 92 "Based on decades of research and actual results in the field, there is broad scientific consensus that rapid migration of transuranics in both colloidal and soluble forms can occur." There is no factual basis for this generalization. Claiming "broad scientific consensus" is simply not true. The problem is complicated by site-specific conditions that do not apply in general; conditions which "Poison in the Vadose Zone" fails to make clear. Many of the transuranics are highly insoluble under most geochemical conditions. Furthermore, rapid migration alone is not sufficient to establish a correlation with risk, since risk is also dependent upon the concentrations of the contaminants. The uninformed reader would have no way of knowing if the foregoing statement is true.
- 7) Improbable Scenarios - describes presentation of highly improbable scenarios to sensationalize the problem. Example: discussion of Potential Impacts beginning on page 82 that concludes it will take "10 times the volume of the Snake River Plain aquifer to achieve allowable drinking water levels" i.e. dilute the total radioactivity of buried radionuclides with half-lives greater than 100 years down to drinking water standards. This scenario requires: 1) instantaneous and wholesale migration of the contaminants from the vadose zone into the aquifer, and 2) dissolution and/or colloidal suspension of these contaminants within the aquifer. Neither of these processes is favored by the chemistry and hydrology of the vadose zone and the aquifer, or the form of the buried waste.
- 8) Contradictory Discussion - describes inconsistency in the report wherein the report draws conclusions that are blatantly inconsistent with earlier conclusions or acknowledgements. Example: contrast 1) "...there is a large amount of evidence that long-lived radionuclides, including plutonium and americium, have migrated through the vadose zone into the Snake River Plain aquifer" (page 107); with 2) "Even though these data may not have been definitive, action to prevent serious contamination has long been imperative..." (page 103), and 3) "The fragmentary evidence of rapid plutonium migration in water samples..." (page 99).

Sincerely,



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Attachment: Table